

**INDIANA DEPARTMENT OF TRANSPORTATION  
OFFICE OF MATERIALS MANAGEMENT**

**ACCEPTANCE PROCEDURES FOR DOLOMITE AGGREGATES  
ITM No. 205-08T**

**1.0 SCOPE.**

- 1.1** This method sets forth the acceptance procedures to be used when Aggregate Producers request that dolomite aggregates be evaluated for use in HMA surface mixtures. Dolomite aggregates are specified for use under certain ESAL loading conditions to obtain skid-resistant HMA surface courses.

These procedures cover the rapid instrumental chemical analysis and the referee chemical analysis of dolomite for elemental magnesium content.

- 1.2** The values stated in either acceptable English or SI metric units are to be regarded separately as standard, as appropriate for a specification with which this ITM is used. Within the text, SI metric units are shown in parenthesis. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other, without combining values in any way.
- 1.3** This ITM may involve hazardous materials, operations, and equipment and may not address all of the safety problems associated with the use of this test method. The user of the ITM is responsible for establishing appropriate safety and health practices and determining the applicability of regulatory limitations prior to use.

**2.0 REFERENCES.**

**2.1 AASHTO Standards.**

- M 92 Wire-Cloth Sieves for Testing Purposes
- M 231 Weighing Devices Used in the Testing of Materials
- T 248 Reducing Samples of Aggregate to Testing Size

**2.2 ASTM Standards.**

- C 25 Chemical Analysis of Limestone, Quicklime, and Hydrated Lime
- C 1271 X-Ray Spectrometric Analysis of Lime and Limestone
- C 1301 Major and Trace Elements in Limestone and Lime by Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP) and Atomic Absorption (AA)
- D 2698 Determination of Pigment Content of Solvent-Reducible Paints by High Speed Centrifuging

### **2.3 ITM Standards.**

- 207 Sampling Stockpiled Aggregates
- 571 Quantitative Extraction of Asphalt/Binder and Gradation of Extracted Aggregate from HMA Mixtures

**3.0 TERMINOLOGY.** Definitions for terms and abbreviations will be in accordance with the Department's Standard Specifications, Section 101.

**4.0 SIGNIFICANCE AND USE.** This ITM will be used to evaluate dolomite aggregates for use in HMA surface mixtures.

### **5.0 APPARATUS.**

- 5.1** Instrumentation in accordance with ASTM C 25, C 1271, or C 1301
- 5.2** Balance, Class A, in accordance with AASHTO M 231
- 5.3** High-speed centrifuge in accordance with ASTM D 2698
- 5.4** Sieves, in accordance with AASHTO M 92

### **6.0 GENERAL REQUIREMENTS.**

- 6.1** Each Aggregate Producer requesting to have a coarse aggregate tested in accordance with this procedure shall contact the appropriate District Testing Engineer to initiate the approval process.
- 6.2** Testing will be conducted by the Office of Materials Management.
- 6.3** Approval of the source as a dolomitic material will be based on results from either the rapid instrumental analysis or the referee analysis tests.

### **7.0 SAMPLING.**

- 7.1** Sampling of aggregates will be done in accordance with ITM 207.
- 7.2** Each sample will consist of 10 to 15 lbm (5 to 7 kg) of material.
- 7.3 Source Sampling - Coarse Aggregate.**
  - 7.3.1** Coarse Aggregate will be sampled by the District for initial evaluation. Three samples representing materials produced from each proposed dolomitic production ledge or area will be obtained.

**7.3.2** Each sample will be taken from a separate stockpile of at least 1000 t (1000 Mg) of any gradation material being produced.

**7.4 Production Sampling - Coarse Aggregate.** All dolomite coarse aggregates will be sampled for acceptance at the HMA plant, either before or preferably during mix production. The frequency will be one sample per 1000 t (1000 Mg) of dolomite coarse aggregate. A minimum of one sample per source will be obtained for contracts with less than 2000 t (2000 Mg) of dolomite coarse aggregate.

**7.5 Production Sampling - Fine Aggregate.** All dolomite fine aggregate will be sampled for acceptance at the HMA plant, either before or preferably during mix production. The frequency will be one sample per 1000 t (1000 mg) of dolomite stone sand. A minimum of one sample per source will be obtained for contracts with less than 1000 t (1000 Mg) of dolomite stone sand. Only contracts with HMA surface mixtures containing dolomite fine aggregate that is more than 20% of the total aggregate will be sampled.

**7.6 Sample Submittal.**

**7.6.1** Samples will be submitted to the Office of Materials Management for testing.

**7.6.2** The submittal report will indicate the source and the ledges or area represented.

**8.0 PREPARATION OF TEST SAMPLE.**

**8.1 Aggregate Samples.**

**8.1.1** Split at least 1000 g of material in accordance with AASHTO T 248.

**8.1.2** Crush the sample so that all of the material passes the No. 4 (4.75 mm) sieve.

**8.1.3** Split at least 50 g of the minus No. 4 (4.75 mm) material in accordance with AASHTO T 248.

**8.1.4** Pulverize the minus No. 4 (4.75 mm) material so that the sample will pass the No. 60 (250  $\mu$ m) sieve.

## **8.2 HMA Samples.**

**8.2.1** Extract the binder from the sample in accordance with a procedure in ITM 571.

**8.2.2** Prepare the sample in accordance with 8.1.

**8.2.3** To extract the binder from the sample passing the No. 60 (250  $\mu\text{m}$ ) sieve, weigh 10 g into a 50 mL centrifuge tube and add 25 mL Toluene. Stir the solution with a stirring rod, wash the residue from the stirring rod into the centrifuge tube, and centrifuge the material at 10000 rpm in a highspeed centrifuge for 20 minutes. Decant the liquid portion and repeat this procedure three more times using acetone for the last extraction. Dry the sample to a constant weight (mass) at 220°F (105°C).

## **9.0 PROCEDURE.**

**9.1 Referee Analysis.** Determine the elemental magnesium content by EDTA titration in accordance with ASTM C 25, C 1271, or C 1301.

**9.2 Rapid Instrumental Analysis.** Determine the elemental magnesium content using instrumentation in accordance with the performance requirements for alternative test methods of ASTM C 25.

**10.0 CALCULATIONS.** Calculations will be made to convert values reported in accordance with ASTM C 25 to elemental calcium and elemental magnesium contents.

## **11.0 ACCEPTANCE CRITERIA.**

**11.1** If the elemental magnesium content of the aggregate is 10.3 percent or greater, the material will be approved as a dolomitic aggregate.

**11.2** All samples that do not have a value of at least 10.3 percent elemental magnesium content determined by the rapid instrumental analysis will be verified by determining the elemental magnesium content using the referee analysis method.

**11.3** The Department will maintain a list of Approved Dolomite Sources.

**12.0 REPORT.**

- 12.1** All elemental calcium and magnesium content values will be reported to the nearest 0.1 percent.
- 12.2** When the rapid instrumental analysis is used, the elemental magnesium content will be reported.
- 12.3** When the referee analysis is used, the elemental calcium and elemental magnesium contents will be reported.

**13.0 PRECISION.**

- 13.1** The within-laboratory standard deviation for elemental calcium is 0.21 percent, and for elemental magnesium content is 0.13 percent.
- 13.2** The between-laboratory standard deviation for elemental calcium is 0.22 percent, and for elemental magnesium content is 0.17 percent.